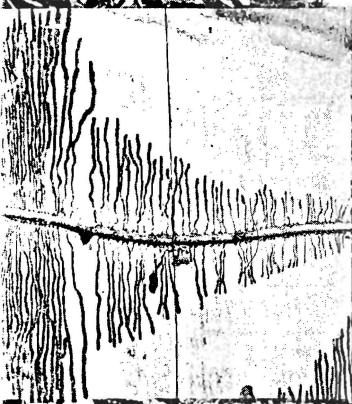
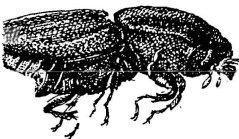


FOREST INSECT & DISEASE MANAGEMENT
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**FOREST PEST CONDITIONS
IN CALIFORNIA
1961**

Official Report of the
CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

The California Forest Pest Control Action Council was formed in 1951 in recognition of the need for close cooperation among land managers concerned with forest pest problems. Primarily an advisory and coordinating group, the Council sponsors a Statewide cooperative forest pest detection survey; publishes an annual report of forest pest conditions; studies, endorses, and supports desirable pest control actions; reviews control needs and programs, and stimulates action where needed; and provides a forum for the exchange of pest control information. The California State Board of Forestry has designated the Council as its official advisory group for forest insect and disease problems.

The Council comprises the following organizations:

- California Forest Protective Association
- California Redwood Association
- State of California
 - Department of Agriculture
 - Department of Conservation
 - Department of Fish and Game
 - Department of Parks and Recreation
 - University of California
- U. S. Department of Agriculture
 - Forest Service
- U. S. Department of the Interior
 - Bureau of Indian Affairs
 - Bureau of Land Management
 - Fish and Wildlife Service
 - National Park Service
- Western Pine Association

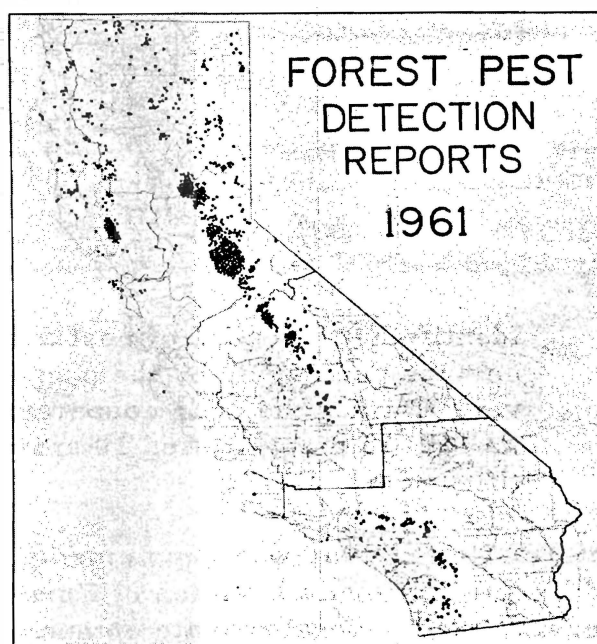
FOREST PEST CONDITIONS IN CALIFORNIA - 1961 was prepared by the Forest Service and the Fish and Wildlife Service in cooperation with other members of the Council. It is duplicated and distributed by the California Division of Forestry.

Cover: Fir engraver damage in white fir on the Modoc National Forest. The inserts from top to bottom show eggs, a larva, an adult insect, and the characteristic tunnels under the bark.

FOREST PEST DETECTION IN CALIFORNIA

The information on which this report is based comes from several sources, the most important of which is the California Cooperative Forest Pest Detection Survey. This survey was initiated by the Council in 1951 to provide the broadest possible base for pest-condition appraisals, and to enlist the services of as many field observers as possible. It operates in the following way: pest conditions, ranging in size from single-damaged trees to major outbreaks involving hundreds of acres, are detected by individual cooperators in the course of their usual field duties. In many cases the cause of damage is unknown and the cooperator is interested primarily in having the pest identified. A standard report form is used to facilitate processing. The Forest Service Regional Office in San Francisco acts as a clearing house for this information, identifying unknown pests, evaluating outbreak conditions where the need arises, and summarizing and interpreting the accumulated data. (This service was performed formerly by the Pacific Southwest Forest and Range Experiment Station.) In 1961, 933 reports were received: 774 for insects, 108 for disease, and 51 for animal pest damage.

FOREST PEST DETECTION REPORT			
TWP. <u>6N</u>	COUNTY or Forest <u>CALAVERAS</u>	DATE: <u>11-16-61</u>	
RNGE. <u>13E</u>	Location (loc aldrainage or place):		
SEC. <u>12</u>			
Tree species damaged: <u>MONTEREY PINE</u>		Est. no. trees: <u>200</u>	Est. acres involved: <u>200</u>
Single trees <input type="checkbox"/>	Reprod. <input type="checkbox"/>	Poles <input checked="" type="checkbox"/>	Plant. <input type="checkbox"/>
Groups <input type="checkbox"/>	Saplings <input type="checkbox"/>	Young seedlings <input checked="" type="checkbox"/>	Old growth <input type="checkbox"/>
No. in group			
INSECT <input checked="" type="checkbox"/>	Name of pest (if known): <u>IPS - DS.</u>		
DISEASE <input type="checkbox"/>	Part of tree damaged: (circle)		
ANIMAL <input type="checkbox"/>	Root <input type="checkbox"/>	Leader <input type="checkbox"/>	Twig <input type="checkbox"/>
UNKNOWN <input type="checkbox"/>	Branch <input type="checkbox"/>	Trunk <input checked="" type="checkbox"/>	Bud <input type="checkbox"/>
			Foliage <input type="checkbox"/>
Damage increasing <input checked="" type="checkbox"/>		Damage decreasing <input type="checkbox"/>	
		Damage static <input type="checkbox"/>	
Evaluation needed <input checked="" type="checkbox"/>		No evaluation needed <input type="checkbox"/>	
REMARKS, SYMPTOMS, AND CONTRIBUTING FACTORS:			
2 GROUPS OF 40 TREES EACH AND 1 GROUP OF 50 TREES - ESTIMATE 200 INFESTED TREES IN THIS AREA.			
Name and address of reporter: <u>JAMES F. FOX</u>			
<u>C.D.F., WEST POINT, CALIF.</u>			



In 1961, 933 insect, disease, and animal damage detection reports were received from State, Federal, and industrial cooperators throughout the State. Report forms are available from local offices of the California Division of Forestry or the Forest Service.

Another major source of information is the Forest Disease Survey, a 10-year operation designed to appraise forest disease conditions throughout the State. This survey, which is carried out by the Forest Service, employs randomly selected, temporary plots on which all trees are examined closely by skilled forest

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pathologists. Although complete results will not be available until about 1967, the survey has been planned so that preliminary summaries are possible. To date 411 plots supporting over 10,000 trees have been examined. For many diseases this body of information is now sufficiently great to reveal major trends. As additional data are added each year, these conclusions will be strengthened.



Identifying the cause of pest damage is an important service performed by the cooperative detection survey. During the year cooperators submitted about 200 insect, 75 disease, and 10 animal specimens for identification.

Survey information in 1961 was supplemented by numerous aerial examinations conducted by the California Division of Forestry, the National Park Service, the Forest Service, and several private companies.

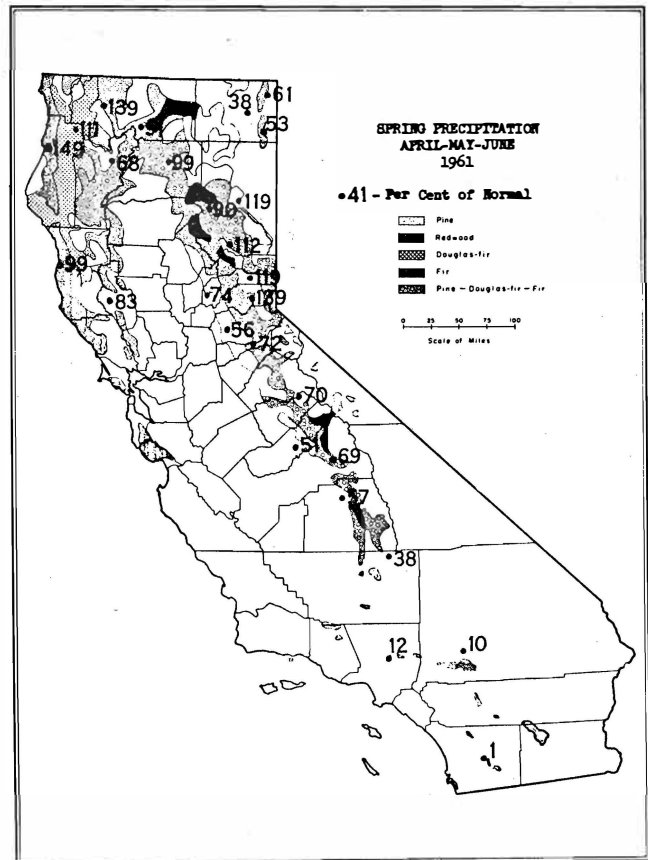
HIGHLIGHTS OF FOREST PEST CONDITIONS IN 1961

Forest pest outbreaks in California involve many factors and seldom can be ascribed to single causes. During 1961, for example, insects teamed up with diseases in the Siskiyou Mountains, where thousands of trees succumbed to a combined attack of dwarfmistletoe, cytospora canker and roundheaded borers. In the central Sierra Nevada, engraver beetles that build up in slash joined western pine beetles in lethal attacks on drought-weakened stands of ponderosa pine. In Southern California widespread and heavy dwarfmistletoe infections together with a 10-year period of subnormal precipitation set the stage for the most damaging bark-beetle attacks on record.

Some of the most serious western pine beetle and ips outbreaks yet experienced occurred in 1961. Throughout the State bark-beetle activity was closely associated with the amount of spring precipitation. In most northern counties normal levels of precipitation were exceeded, but in the extreme south it was about one-tenth of normal. Where spring precipitation was about half normal, serious outbreaks occurred. This was the case in the central Sierra Nevada where explosive bark-beetle conditions developed. Southern California, where precipitation has been subnormal for 10 years, experienced its worst bark-beetle outbreaks to date. In Northern California the situation improved markedly where logging of about 150 million board feet of merchantable insect-infested timber during the winter and spring and direct control checked dangerous build-ups.

A clear picture of widespread and severe dwarfmistletoe infection is emerging from the information supplied by the Forest Disease Survey. Preliminary results indicate that 7 per cent of the sugar pine, 12 per cent of the ponderosa pine, 18 per cent of the white fir, and 37 per cent of the red fir in the State is infected with this parasite.

Throughout its range red fir is heavily infected with cytospora canker which is normally a weak parasite closely associated with dwarfmistletoe. During the



Critical insect losses in 1961 were confined mainly to regions where spring precipitation was half normal or less.

present period of moisture stress, the combined attack of dwarfmistletoe and cytospora canker of red fir constitutes a major threat throughout the State.

In the vicinity of Dry Lake, Siskiyou County, losses estimated to be in the neighborhood of 50 million board feet occurred in red fir stands as a result of round-headed fir borer attacks and dwarfmistletoe and cytospora infections.

Fomes root disease, potentially the most damaging of forest root disorders, has been reported locally throughout the State. An outbreak in pole-size pines at the Institute of Forest Genetics, Placerville, is causing severe damage.

Fir engraver beetles are estimated to have killed a greater volume of timber in 1961 than any other forest insect in California and are believed to have been responsible for the heaviest insect-caused mortality in true fir yet observed in the State.

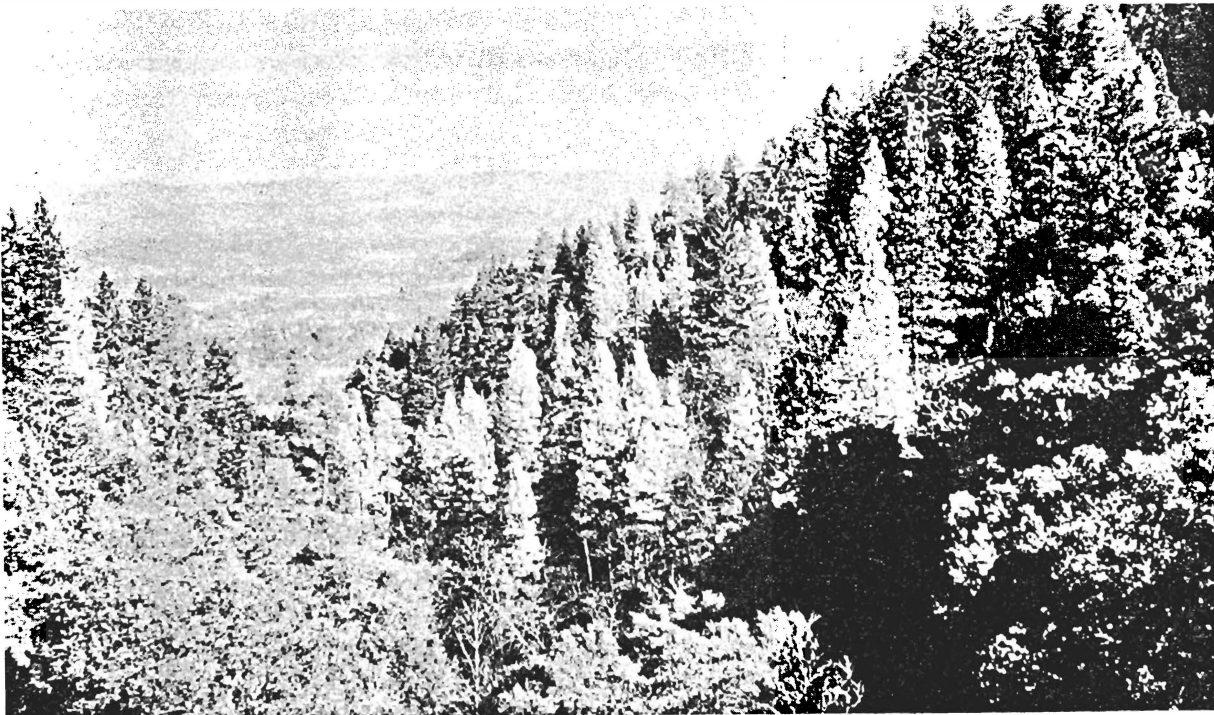
Although the prompt salvage of fire-damaged trees from 1960 burns held bark-beetle activity in check, horntail wasps caused a serious wood-borer problem on several burns in El Dorado, Nevada, and Sierra Counties, especially in white fir trees killed by fire.

The decline of porcupine damage in northeastern California continued for the second year, with the greatest improvement resulting where control action had been taken. In western Sierra Nevada forests, however, porcupine damage to young pine plantations increased along with the accelerated planting program. Losses up to 25 per cent of the planted trees occurred in some plantations. Damage started in the fall as drought conditions dried up the succulents normally used for food. Deer and elk browsed heavily in Douglas-fir, redwood, and pine regeneration, and in pine plantations. For the second consecutive year squirrels girdled young trees in several portions of the State.

THE STATUS OF FOREST INSECT PESTS

WESTERN PINE BEETLE, Dendroctonus brevicomis, activity varied in 1961. In the north coast zone no significant losses were reported, and in northeastern California outbreaks in virgin ponderosa pine were confined to three locations: Blacks Mountain, Big Valley Mountain, and near the town of Nubieber in Lassen County. In the central and southern Sierra Nevada, however, combined attacks of western pine beetles and ips caused serious damage to ponderosa pine in the lower middle foothill pine belt from El Dorado County south to Kern County. A 400-acre accumulation of ponderosa pine logging slash along State Highway 88 near Dew Drop, Amador County, triggered an ips-western pine beetle outbreak that resulted in more than 1,500 infested trees.

Other outbreaks took place in the Bishop, Alder, and Mosquito Creek drainages of Yosemite Park; Fence Meadow in Madera County; Cherry Flat, Eshom Creek, Pine Ridge, Flume Creek, and Cedar Brook in Tulare County; and in the Tule Indian Reservation. Losses in Sequoia National Park were the heaviest ever recorded, and serious outbreaks in the ponderosa and Coulter pine stands of Southern California were sustained in the vicinity of Julian, Lost Valley, Palomar Mountains, May Valley, Baldy Mountain, Vista Grande, Black Mountain, North Fork and Browns Flat.



Thousands of young, thrifty ponderosa pines were killed by ips-western pine beetle outbreaks in the central Sierra Nevada foothills.

IPS, Ips spp., infestations were common and aggressive in most of the western pine beetle outbreaks in the central and southern Sierra Nevada and in Southern California, but very little ips activity was reported or observed in the north coast region or in northeastern California, where spring precipitation was normal. Only 12 ips detection reports were received from the north coast and northeastern California, while 197 ips reports were received from the rest of the State. Attacking alone, ips seriously damaged Coulter and Jeffrey pine in Southern California in the vicinity of Indian Canyon, Pine Hills, Santa Rosa Mountain,



Group killing by ips and western pine beetles was common in foothill Coulter pine stands in Southern California.

Lake Hemet, Slover Canyon, Circle Mountain, and Tanbark Flats. Tanbark Flats, Los Angeles County, was the site of the most explosive of these outbreaks. Here, during a three-week period in late September and early October, about 25 per cent of all the trees that had survived the 1960 fire became infested.

FIR ENGRAVER, Scolytus ventralis, damage in white and red fir was serious and Statewide. This insect caused more tree mortality this year than any other forest insect in California. Losses were particularly high in the Warner Mountains, Modoc County, in the vicinity of Roop Mountain, Lassen County, near Quincy in Plumas County, near Lake Tahoe, in Placer and El Dorado Counties, and in the Wright's Hill, Rush, and Clavey Creek basins, Tuolumne County.

MOUNTAIN PINE BEETLE, Dendroctonus monticolae, losses of outbreak proportion continued in lodgepole pine stands of the Warner Mountains in Modoc County. The Military Pass outbreak in Siskiyou County, reported last year, has subsided somewhat following salvage logging. New infestation centers were reported at Glass Mountain and Medicine Lake in Modoc County. Mountain pine beetle activity in lodgepole pine has subsided considerably in the vicinity of Tuolumne Meadows in Yosemite Park where control has been underway for several years; only half as many infested trees were spotted here in 1961 as in 1960. Losses in second-growth ponderosa pine in the Joseph and Mill Creek basins in Modoc County continue at a high outbreak level.

Where sugar pine was the host in the southern Sierra Nevada, mountain pine beetle activity resulted in an accelerated rate of loss. Heavy group killing in mature sugar pine was noted in Yosemite, Sequoia, and Kings Canyon National Parks, and in the Tule Indian Reservation. Group killing was again reported in the second-growth sugar pine stands in the Lewis and Miami Creek basin, Madera County, and at a newly discovered center in Tulare County.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi, losses in Jeffrey pine were spotty. Significant outbreaks were reported near Rush Creek in Modoc County, Roop Mountain in Lassen County, in the lower Deadman portion of Inyo County, and in the Big Bear Valley and upper Santa Ana area in Southern California.

RED TURPENTINE BEETLE, Dendroctonus valens, was unusually aggressive in some stands, killing many otherwise uninfested trees.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae, activity has been slight, and no significant outbreaks were reported in 1961. A potentially serious build-up of this insect was prevented in Salt Gulch and West Grider Creek, Siskiyou County, by the prompt salvage of blowdown timber.

DOUGLAS-FIR ENGRAVER, Scolytus unispinosus, damage in Douglas-fir remained at a low level, and very little evidence of this insect was apparent.

HORNTAILS OR WOOD WASPS, Sirex spp., of several species caused serious damage in fire-injured white and red firs and incense-cedars in several of the 1960 burns in El Dorado, Nevada, and Sierra Counties. Mill owners processing timber from these burns were concerned by the presence of these wood borers.



Horn-tail wasps were found to have attacked and seriously damaged many fire-killed fir and incense-cedars in the 1960 Volcano burn, El Dorado County. Inserts show an adult female and a larva tunneling in processed wood.

CALIFORNIA FLATHEADED BORER, Melanophila californica, continued to cause serious damage to Jeffrey pine in Southern California.

LODGEPOLE NEEDLE MINER, Evagora milleri, infestations on about 5,000 acres near Tuolumne Meadows, Yosemite National Park, were controlled in 1961 by means of aerial spraying. The Tuolumne Meadows center covering 60,000 acres is the largest outbreak of this pest in California. Another serious infestation, although much less extensive, is located in the Woods Creek-Rae Lakes region of Kings Canyon National Park; a third is near Mineral King in Tulare County. Heavy damage by a closely related species continued over some 2,000 acres near Sentinel Meadows in Mono County.



In 1961 small-scale logging operations, which provide an effective means of bark-beetle control, harvested about 150 million board feet of insect-infested pine timber.

SPRUCE BUDWORM, Choristoneura fumiferana, activity in white fir showed a substantial decline this season in the Warner Mountains, Modoc County, where no significant tip-killing was observed. A defoliator outbreak on white fir in Rush Creek, Modoc County, originally thought to be spruce budworm, was found to be the work of an unidentified needle miner.

LARGE ASPEN TORTRIX, Choristoneura conflictana, activity continued at a high level on aspen in the vicinity of Homestead Flat and Long Valley in Modoc County and expanded into adjacent areas. The infestation now covers about 3,500 acres.

PINE REPRODUCTION WEEVIL, Cylindrocopturus eatoni, losses were serious in low-elevation ponderosa and Jeffrey pine plantations near Groveland, Tuolumne County, and in natural regeneration in the low- and mid-elevation ponderosa pine

belt of the central Sierra Nevada. Losses in natural stands are the highest on record. Reproduction weevil losses were reported for the first time in natural stands of sugar pine in the central Sierra Nevada and in various species and hybrids of white pine at the Institute of Forest Genetics at Placerville.

SEED AND CONE INSECTS took a heavy toll of the light to moderate crop on most commercial conifers. A very light cone crop on sugar pine was almost completely destroyed by the sugar pine cone beetle, Conophthorus lambertianae. Cone moths, Dioryctria abietella and Barbara colfaxiana, together with a midge, Contarinia spp., heavily damaged a light crop of Douglas-fir cones. Seed chalcids, Megastigmus spp., and seed maggots, Euromyia spp., nearly destroyed a light cone crop in white and red fir. Nearly all of the cones cross-pollinated in 1961 as a part of the Forest Service tree improvement program were destroyed by insects.

OTHER INSECTS. Several species of Neodiprion sawflies were reported locally to have defoliated young pines, white firs, and Douglas-firs. Two white fir defoliators were reported in outbreak proportions for the first time. One, a weevil, tentatively identified as Agonus cinerarius, caused heavy defoliation on about 5,000 acres west of Lake Tahoe and in scattered spots over several thousand acres near Manzanita Mountain, Modoc County; the other, an undetermined needle miner thought to be a species of Evagora, was active on about 5,000 acres in the Rush Creek basin, Modoc County. Damage by the latter is similar to that of the spruce budworm.

The flatheaded borers, Melanophila gentilis and Melanophila drummondi, were a source of scattered local damage at lower elevations in the central Sierra Nevada where sugar pine and Douglas-fir on dry sites were attacked.

Losses up to 3,000 board feet per acre on about 15,000 acres resulted from attacks of the roundheaded fir borer, Tetropium abietis, in the vicinity of Dry Lake, Siskiyou County. Red fir trees severely infected with dwarfmistletoe and cytospora canker were killed by a combined insect and disease attack in this area.

Insect control accomplishments for 1961 are presented in tables 1 and 2. The control actions recommended by the California Forest Pest Control Action Council are given in table 3.

TABLE 1--VOLUME OF TIMBER LOGGED FOR INSECT CONTROL IN 1961^{1/}

COMPANY OR AGENCY	ACRES TREATED	THOUSAND BOARD FEET REMOVED			TREE SPECIES
		INSECT INFESTED TREES	INSECT SUSCEPTIBLE TREES	WINDTHROW OR FIRE-KILLED TREES	
		PRIVATE	LANDS		
American Forest Products	2,689	900	11,700	1,000	PP,SP,JC
Bear Valley Mutual Water	-	25	25	-	PP
Big Bear Timber	2,500	800	5,100	-	JP,PP,WF
Blagen Lumber	315	180	530	50	PP,SP
Collins Pine	3,000	250	4,700	250	PP,SP,WF,DF
Crawford Lumber	2,000	1,000	1,000	2,000	PP,WF,DF
C.R.E.K. Ranch	1,000	500	400	1,000	PP,WF,IC
Diamond National	8,000	1,388	35,540	-	SP,PP
Fibreboard Paper Products	3,217	5,000	40,000	7,000	WWP,JP,WF,RF,DF
Fruit Growers Supply	6,152	4,128	2,655	500	PP,SP
J. E. Hench Estate	-	15	-	-	PP,SP
International Paper	2,000	1,000	15,000	2,000	PP,SP,DF,WF,RF,IC
Ken Del Ranch	160	100	-	-	RF
Michigan-California	750	250	1,500	500	SP,PP,WF
Mt. Whitney Lumber	320	83	20	-	JP,PP,SP
H. J. Pahland	-	25	-	-	PP
Pickering Lumber	940	750	15,000	2,000	SP,PP,WF,DF
Pine Logging	80	500	2,000	100	WF,RF,SP,PP
Scott Lumber	6,820	7,315	9,765	350	PP,SP,WF,DF,IC,RF
Sequoia Forest Industries	680	150	100	25	PP,SP
J. F. Sharp Lumber	100	50	150	25	PP,DF
Shasta Forests	3,500	2,000	-	-	WF
Ralph Smith Lumber	11,500	5,500	26,000	5,000	PP,SP,DF,WF,IC,LP
Southern California Edison	550	50	-	3,000	SP,WF,PP
Southern Pacific Land	11,900	4,100	47,900	13,000	PP,SP,LP,RF,WF
Stockton Box	800	100	-	-	PP,SP,WF,DF,IC
Sunny Slope Ranch	-	12	-	-	SP
Tahoe Timber	1,600	200	500	3,800	RF,WF,JP,WWP
W. T. Taylor	-	60	15	-	DF
Trinity Alps Lumber	680	250	10,000	-	PP
Geo. H. Vols	-	75	-	-	PP
Walker Forest	5,700	400	15,000	600	PP,SP,DF,WF
Winton Lumber	4,163	2,059	6,511	283	PP,SP,DF,WF
Subtotal	81,116	39,215	251,111	42,483	
NATIONAL FOREST LANDS					
Subtotal		93,689	314,990	366,411	
TOTAL FOR CALIFORNIA					
Total		132,904	566,101	408,894	

^{1/} Based on the data submitted by companies or agencies reporting, which is not complete for the State as a whole.

TABLE 2--INSECT CONTROL PROJECTS ACCOMPLISHED IN 1961, BY AGENCIES AND AREAS

LOCATION	NO. ACRES	NO. TREES	INSECT	HOST	CONTROL METHOD	COST
STATE AGENCIES AND PRIVATE OWNERS						
Corte Madera	3,120	23	Mc,Ips	JP,CP	Chemical	\$ 575
Cuyamaca Rancho State Park	3,000	63	Mc,Db,Ips	JP,CP,PP	Chemical	1,900
Mother Lode	5,100	623	Db,Ips	PP	Chemical; peel-burn	2,212
Sierra	2,000	120	Ips,Db	PP	Chemical; peel-burn	494
San Bernardino	16,172	1,100	Db,Dm,Dj,Mc,Ips	PP,SP,JP,CP	Chemical	13,966
San Jacinto	14,250	975	Db,Mc,Ips	PP,JP,CP	Chemical	11,935
Tule	1,000	629	Db,Ips	PP	Chemical	1,380
Sequoia and Kings Canyon	3,100	5,521	Db,Ips	PP	Chemical; peel-burn	6,795
Wrightwood	1,100	370	Mc,Ips	JP	Chemical	4,000
Subtotal	48,842	9,424				\$ 43,257
NATIONAL PARKS						
Yosemite	57,835	971	Db,Dm,Dj,Mc,Ips,Sv	PP,SP,LP,JP,WF	Chemical	\$ 32,675
Yosemite	1,800	2,301	Dm	LP	Chemical	21,211
Yosemite	4,872	-	Em	LP	Chemical	53,825
Lassen	2,100	192	Db,Dm,Dj	PP,SP,JP	Chemical	3,570
Lassen	2,000	255	Dm	LP	Chemical	6,160
Sequoia and Kings Canyon	31,920	3,518	Db,Dm,Dj	PP,SP,JP	Chemical	83,125
Subtotal	100,527	7,237				\$200,566
NATIONAL FORESTS						
Angeles	8,762	751	Db,Mc,Dm,Dj	PP,JP,CP,SP	Chemical; logging	\$ 11,355
Cleveland	3,660	1,039	Mc,Ips,Db	JP,CP	Chemical	11,282
Eldorado	10,330	1,835	Ips,Db	JP,PP	Chemical	8,484
Klamath	1,528	874	Dp,Dm,Db	DF,PP	Logging	4,321
Lassen	54,534	15,331	Db,Dj,Ips,Dm	JP,PP,SP	Chemical; logging	18,948
Los Padres	7,700	439	Mc,Ips,Db	CP,JP,PP	Chemical	7,395
Mendocino	1,841	435	Db,Ips,Dm	PP,SP	Chemical; logging	3,638
Modoc	30,000	1,900	Db,Ips	PP	Logging	2,075
Plumas	122	695	Db,Ips,Dm	PP,SP,WF,LP,RF	Chemical; logging	2,487
San Bernardino	62,261	3,698	Ips,Db,Dm,Dj,Mc	PP,JP,SP,CP	Chemical; logging	54,072
Sequoia	10,762	6,373	Dj,Db,Ips,Dm	PP,SP,JP	Chemical; logging	20,057
Shasta-Trinity	6,595	3,533	Db,Dm,Ips	PP,LP,SP	Chemical; logging	9,352
Sierra	53,807	14,845	Dm,Dj,Ips,Db	PP,JP,SP	Chemical; logging	108,715
Stanislaus	36,409	9,171	Dm,Ce,Db,Ips,Dj	SP,PP,JP	Chemical; logging	22,301
Tahoe	1,084	916	Db,Dm,Ips,Sv	PP,SP,WF	Chemical; logging	2,402
Subtotal	289,395	61,835				\$286,824
Total	438,764	78,496				\$530,717

TABLE 3--FOREST INSECT CONTROL ACTIONS RECOMMENDED BY THE COUNCIL

INFESTATION AREA	ESTIMATED ACREAGE	COUNTY	INSECT	HOST	RECOMMENDED ACTION
COMMERCIAL TIMBERLANDS					
Blacks Mt.	3,500	Lassen	Db	PP	Log infested trees
Big Valley Mt.	*	Lassen	Db	PP	Log infested trees
Boggs Mt.	*	Lake	Db-Ips	PP	Evaluation
Camp One	*	Modoc	Dm	LP	Log infested trees
Dry Lake	15,000	Siskiyou	Ta	WF	Log infested trees
Eshom-Pierce	5,000	Fresno	Db-Ips	PP	Log or treat infested trees
Ft. Bidwell	1,800	Modoc	Sv	WF	Surveillance
Glass Mt.- Medicine Lake	*	Modoc	Dm	LP	Evaluation
Ice House Burn	16,000	El Dorado	Db-Ips	PP	Log or treat infested trees
Joseph Creek	1,000	Modoc	Dm	PP	Surveillance
Lewis-Miami Creek	*	Madera	Dm	SP	Evaluation
Military Pass	4,480	Siskiyou	Dm	LP	Surveillance
Manuel Mill	15	Calaveras	Seed & Cone	PP	Evaluation
Nubieber	*	Lassen	Db	PP	Log infested trees
Poison Lake	55	Lassen	Seed & Cone	PP	Evaluation
Roop Mt.	3,000	Lassen	Dj-Sv	JP-WF	Log infested trees
Route 88	700	Amador	Db-Ips	PP	Log infested trees
Sentinel Mtns.	2,200	Inyo	Em	LP	Evaluation
Stanislaus	10,000	Tuolumne-Calaveras	Hp	WF	Surveillance
Warner Mts.	*	Modoc	Cf	WF	Surveillance
Warner Mts.	*	Modoc	Cc	Aspen	Surveillance
STATE AND NATIONAL PARKS					
Cuyamaca Rancho State Park	8,000	San Diego	Mc	JP	Treat infested trees
Lassen Volcanic National Park	3,000	Shasta-Lassen	Ips,Dj,Db,Dm	JP,PP,LP	Treat infested trees
San Jacinto State Park	*	Riverside	Db,Ips	CP,PP	Treat infested trees
Sequoia and Kings Canyon National Parks	8,500	Fresno & Tulare	Db,Dm,Ips	PP,SP	Treat infested trees
Yosemite National Park	57,700 1,300 62,000	Mariposa-Tuolumne	Db,Dm,Ips	PP,SP	Treat infested trees
		Mariposa-Tuolumne	Dm	LP	Treat infested trees
		Mariposa-Tuolumne	Em	LP	Surveillance

INFESTATION AREA	ESTIMATED ACREAGE	COUNTY	INSECT	HOST	RECOMMENDED ACTION
FOREST RECREATION AREAS					
Arrowhead-Crestline	46,000	San Bernardino	Dm,Db,Ips,Dj	PP,CP,JP	Sanitation-salvage Log or treat infested trees
Alamo Mt.	6,500	Ventura	Dj,Mc,Db	JP,PP	Treat where needed
Barton Flats	15,000	San Bernardino	Db,Dj	PP,JP	Log or treat infested trees
Bass Lake	9,000	Madera	Db,Ips	PP	Log or treat infested trees
Big Bear Valley	8,800	San Bernardino	Dj,Ips	JP	Appraisal complete, consider control recommendations
Big Pines	8,000	Los Angeles	Mc,Ips	JP	Log or treat infested trees
Charlton Flats	3,400	Los Angeles	Db,Ips,Mc	PP,CP,JP	Log or treat infested trees
Corte Madera	1,600	San Diego	Db,Ips,Mc	CP,JP,PP	Treat infested trees
Crystal Lake	1,500	Los Angeles	Db,Dm,Dj	PP,SP,JP	Treat infested trees Sanitation-salvage
Deadman Creek	10,000	Mono	Dj,Mc	JP	Log or treat infested trees
Upper Deadman	1,000	Mono	Dj,Mc	JP	Sanitation-salvage
Figueroa Mt.	2,000	Santa Barbara	Db,Ips	PP,CP	Treat infested trees
Grade Valley	5,000	Ventura	Mc	JP	Log or treat infested trees
Idyllwild-San Jacinto	37,000	Riverside	Mc,Db,Ips,Dm	SP,PP,CP,JP	Log or treat infested trees
Laguna Mt.	9,700	San Diego	Db,Mc	CP,JP	Treat infested trees
Lost Valley	4,000	San Diego	Db,Ips	CP	Treat infested trees
May Valley	3,400	Riverside	Db,Ips,Mc	CP,JP	Sanitation-salvage
Palomar Mt.	6,600	San Diego	Db,Ips	CP	Surveillance
Holcomb Valley	43,000	San Bernardino	Dj,Mc,Ips	JP,WF	Sanitation-salvage Log infested trees
Upper Santa Ana	12,000	San Bernardino	Dj,Mc	JP	Sanitation-salvage
Winston Springs	6,600	Los Angeles	Mc,Dj	JP	Treat infested trees
Wrightwood	7,700	San Bernardino	Mc,Ips	JP	Treat infested trees
EXPERIMENTAL AREAS					
Institute of Forest Genetics	8,200	El Dorado	Db,Ips	PP	Treat infested trees
Browns Flat	32	Los Angeles	Db	PP	Treat infested trees
Tanbark	30	Los Angeles	Ips	CP-KP	Treat infested trees

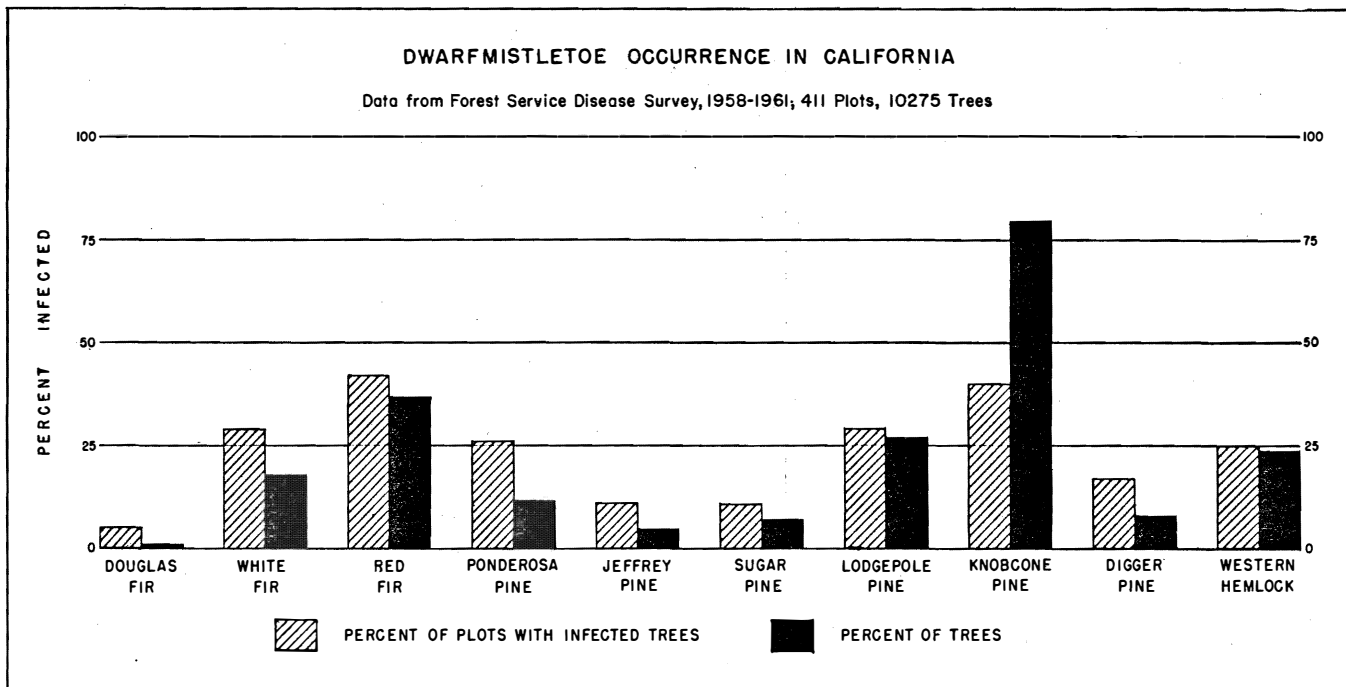
* Acreage not known.

Key to Abbreviations

Insect	Host
Cc - Large aspen tortrix	Em - Lodgepole needle miner
Ce - Pine reproduction weevil	Hp - Douglas-fir tussock moth
Cf - Spruce budworm	Ips - Pine ips
Db - Western pine beetle	Mc - California flatheaded borer
Dj - Jeffrey pine beetle	Md - Flatheaded fir borer
Dm - Mountain pine beetle	Sv - Fir engraver
Dp - Douglas-fir beetle	Ta - Roundheaded fir borer
	CP - Coulter pine
	DF - Douglas-fir
	IC - Incense-cedar
	JP - Jeffrey pine
	KP - Knobcone pine
	LP - Lodgepole pine
	PP - Ponderosa pine
	RF - Red fir
	SP - Sugar pine
	WF - White fir

THE STATUS OF FOREST DISEASES

DWARFMISTLETOE, *Arceuthobium* spp., is fast becoming recognized as one of California's major forest pests. Dwarfmistletoe not only kills and damages host conifers directly but also lowers tree vigor setting the stage for attack by insects and other diseases. During periods of moisture stress, pines heavily infected with dwarfmistletoe are particularly susceptible to bark-beetle attacks. Statewide occurrence of dwarfmistletoe is given in the chart below.



Dwarfmistletoe is widespread and severe. Distribution is indicated by the per cent of plots on which it was found; intensity of infection by the per cent of trees infected.

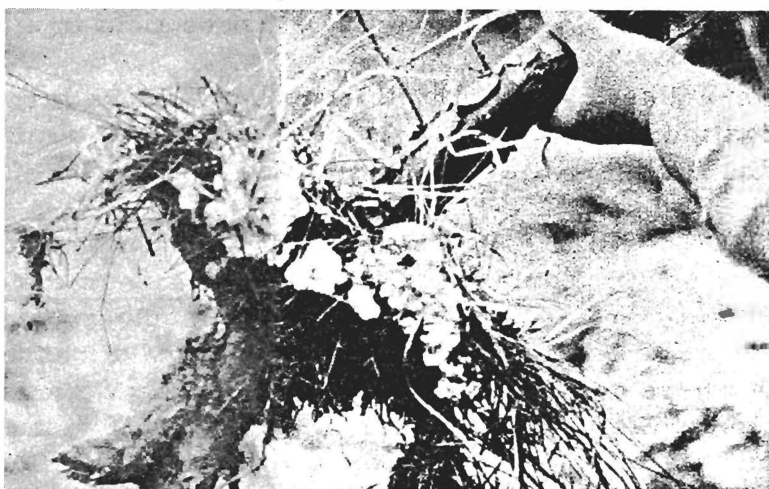
CYTOSPORA CANKER, *Cytospora abietis*, generally a weak parasite on red and white firs, usually becomes established on limbs through wounds in the bark. Mature trees, particularly red firs, heavily infected with dwarfmistletoe are highly susceptible to cytospora canker when weakened by drought, fire, insects, or other causes. Subnormal precipitation in recent years is probably responsible for the sudden flare-up of cytospora canker at several locations in Northern California. Red fir stands throughout the State are being severely damaged by combined attacks of dwarfmistletoe and cytospora canker. This is particularly true in Siskiyou County where many infected trees lost the lower third of their crowns in 1960 and the middle third in 1961. Many of the trees were killed directly by the diseases; others succumbed to a joint insect-disease attack. Unless the diseases abate, thousands of red firs will be killed in 1962.

ROOT DISEASES throughout the history of intensive forest management in Europe, and in this country, have invariably become major pests. These disorders are widely distributed in California and may be strongly pathogenic in some forests.

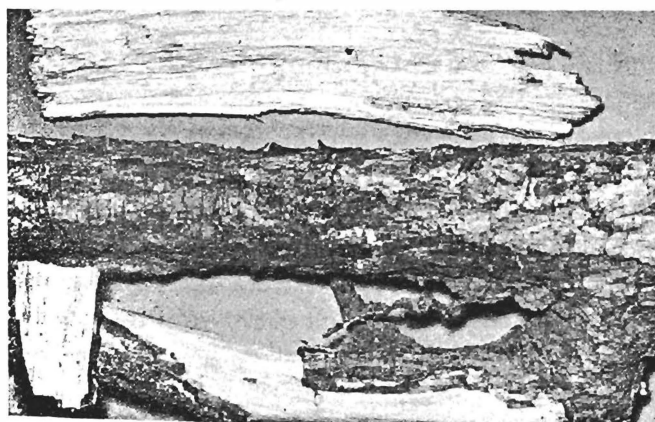
Fomes annosus is probably the most damaging root disease in California forests. Although no comprehensive survey has been made, local F. annosus infection centers are believed to occur generally throughout the timbered portions of the State. Two infection centers were discovered in Yosemite National Park in 1961. At one, ponderosa pine, incense-cedar, and lodgepole pine were dying; in the other, only ponderosa pine was affected. In Tuolumne County infection was reported on sugar pine from two locations and on the roots of windthrown true firs from another site. A recent outbreak of the disease in pine plantations of the Institute of Forest Genetics at Placerville illustrates the wide range of pine



A



B



C



D

Fomes annosus is probably the most damaging root disease in the forested areas of California. A. Dead and dying pine trees at the Institute of Forest Genetics, Placerville. B. Spore-producing bodies at ground level on incense-cedar. C. Decayed wood and silvery striations of the inner bark. D. Close-up of a sporophore on a dead root.

susceptibility: 24 species, 3 varieties, and 1 artificial hybrid were attacked. Trees killed by insects frequently are found to have been previously infected and weakened by Fomes annosus.

The presence of a black streak root disease, Verticicladiella spp., (formerly called Leptographium spp.) is often masked by bark-beetle invasion, and the disease probably is more widespread than known infection centers would indicate. The disease has been reported from Modoc, Lassen, and Amador Counties on ponderosa pine, and from San Bernardino County on pinyon pine.

Armillaria root rot, Armillaria mellea, generally a saprophyte on hardwood roots, particularly those of oak, became parasitic and killed several knobcone pines in the Badger Hill tree breeding orchard near Pollock Pines, El Dorado County, and young giant sequoias in a plantation east of Chico. Another root rot, Rhizoctonia solani, was isolated from dying giant sequoia in a plantation in San Diego County.

Nursery diseases, mostly the root rots, were largely held in check in 1961 by soil fumigation. The Forest Service now fumigates nursery seedbeds shortly before seeding. Other forest nurseries are testing the efficacy of soil fumigants.

RUST ON CONIFERS. There was little change in the status of spread and intensification of white pine blister rust, Cronartium ribicola, in 1961. No evidence was found that the disease has extended its southernmost zone of spread since 1944. Within its present zone of spread the disease continued to build up rapidly on white pines where conditions exist that especially favor its development. Intensification of this type is common in northwestern California. Heavy infection occurs less frequently in the southern Cascade and northern Sierra Nevada Ranges. South of Placer County in the central Sierra Nevada and south of Trinity County in the Coast Range white pine blister rust occurs sparingly.

There was little spread from pine to ribes during the spring of 1961, and spread back to the pine in the fall should be equally light. Ribes from the Middle Fork of the American River to the Merced River were heavily infected with pinyon rust.

Limb rust, Peridermium filamentosum and stalactiform rust, Peridermium stalactiforme, were again reported on Jeffrey pine at several places in Southern California. Stalactiform rust on lodgepole pine has been found on one-third of the disease survey plots supporting that species, and on 9 per cent of the lodgepole pines.

The rust on red and white fir known as yellow witches' broom, Melampsorella caryophyllacearum, was reported at several locations in Northern California, and four infection centers ranging in size from one to a few trees were found on the 1961 disease survey plots.

Incense-cedar rust, Gymnosporangium libocedri, is so common that few disease-free stands exist. It is slow in action but undoubtedly reduces the growth rate in heavily infected trees.

A canker of undetermined origin causing sunken open faces in large pole and young mature ponderosa pines has been reported from several places in the Sierra Nevada foothills. Efforts are being made to determine the cause of this canker, which may prove to be an atypical form of western gall rust.



A



B

A canker of undetermined source, causing sunken open faces in young ponderosa pine stands in the Sierra Nevada foothills. A. Front view. B. Side view of another canker.

NEEDLE DISEASES were at the lowest level yet noted; only an occasional infected tree could be found at locations where infection had been observed previously. Needle disease reported in 1961 are: Needle casts, Hypoderma robustum and Hypodermella abietis-concoloris; needle blight, Phacidium infestans var. abietis; and molds, Herpotrichia nigra and Neopeckia coulteri. A needle cast, rarely reported in California, Hypodermella arcuata, killed sugar pine needles of 1960 origin locally in the Hungry Creek drainage of Siskiyou County.

Elytroderma needle blight, Elytroderma deformans, which is confined principally to ponderosa and Jeffrey pine, occurred mainly on trees supporting brooms caused by this fungus. This indicates that 1960 was a poor year for spread, and since fewer fruiting structures than usual were produced, 1961 may also have been a poor spread year. Survey data show elytroderma on about 10 per cent of the ponderosa pine and on nearly 12 per cent of the Jeffrey pine.

NONINFECTIOUS DISEASES again were widespread due to subnormal precipitation, a mid-June heat wave, and severe hail storms. In some of the poorer-growing sites of the Sierra, Cascade, and northern Coast Ranges incense-cedar and Douglas-fir suffered heavy twig dieback or were killed outright. Other species on similar sites were occasionally affected. Heavily diseased trees of all species that normally would have survived for many years died as a result of moisture stress, and many weakly parasitic fungi became more active in trees suffering from moisture deficiency. Without normal precipitation in 1962 an accelerated mortality rate is expected.

Hail severely damaged young trees locally in Plumas, El Dorado, Tehama, and Alpine Counties. Where damage was heaviest, buds and needles were torn from young sugar pines and Douglas-firs by the hailstones. Smaller trees were so severely damaged that heavy mortality may occur in this size class. Ponderosa pines suffered needle and bud damage.

TRUE MISTLETOE, Phoradendron bolleanum var. pauciflorum on white fir, and P. libocedri on incense-cedar, showed no change in status in 1961. The moisture stress in southern Sierra Nevada forests hastened the death of some white fir tops heavily infected with this parasite.

X DISEASE, a disorder of major concern in Southern California, continued to intensify in the Crestline-Lake Arrowhead portion of San Bernardino County and near Crystal Lake in Los Angeles County, where many ponderosa pines are dying each year. Declining trees have been reported elsewhere, but since the identifying characteristics of the disease have not been clearly established, new locations must be carefully verified.

TABLE 4--FOREST DISEASE SURVEY DATA 1958-1961

TREE ^{1/} SPECIES	TOTAL SAMPLE		INFECTION BY NUMBER OF PLOTS AND TREES ^{2/}																
			DWARF MISTLETOE	TRUE MISTLETOES	ELTODERMA DEFORMANS	OTHER NEEDLE CASTS	UNCLASSIFIED FOLIAGE	CRONARTIUM RIBICOLA	GYMNOSPORANGIUM LIBOCEDRI	MELAMPPORELLA CARY.	PERIDERMIUM HARKNESSII	P. STALACTIFORME	P. FILAMENTOSUM	CYTOSPORA ABIETIS	UNCLASSIFIED LIMB CANKER	ECHINODONTIUM TINCTORIUM	FOMES PINI	POLYPORUS SCHWEINITZII	UNCLASSIFIED HEART ROT
Ponderosa pine	Plots	220	58		59	85	9			5							9		53
	Trees	2406	280		233	234	31			5							10		93
Jeffrey pine	Plots	92	10		18	28	2			1	1	1							14
	Trees	773	37		80	91	3			1	1	2							28
Sugar pine	Plots	148	16			15	3	7									2		35
	Trees	534	37			20	6	12									2		44
Lodgepole pine	Plots	48	14		1	2	3			12	16								16
	Trees	535	143		1	14	9			28	48								39
Incense-cedar	Plots	176		39		1			155										3
	Trees	1006		73		2			716										5
White fir	Plots	220	64	11		30	17			3				71	12	12	2	1	146
	Trees	2289	407	18		68	43			3				305	21	19	3	1	526
Red fir	Plots	71	30			2	5			9				28	6	4			44
	Trees	805	296			2	5			32				139	18	6			156
Douglas-fir	Plots	141	7			7	10								38		43	9	70
	Trees	1378	14			25	21								102		115	10	223
Digger pine	Plots	6	1			1				1									
	Trees	13	1			4				1									
Juniper	Plots	26				1	4												9
	Trees	119				3	6												15
Knobcone pine	Plots	5	2		1					1									
	Trees	29	23		1					7									
Western hemlock	Plots	4	1																3
	Trees	21	5																5
Western white pine	Plots	22				3		2											6
	Trees	82				8		3											6
Redwood	Plots	14																	9
	Trees	248																	156

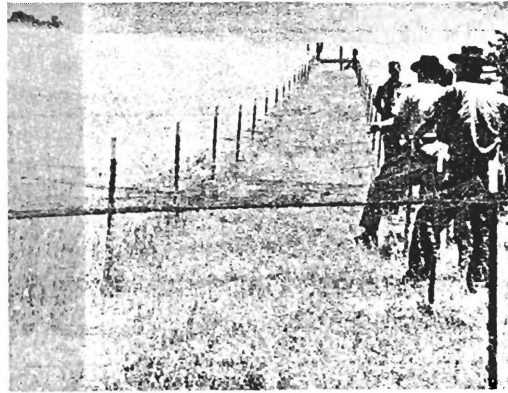
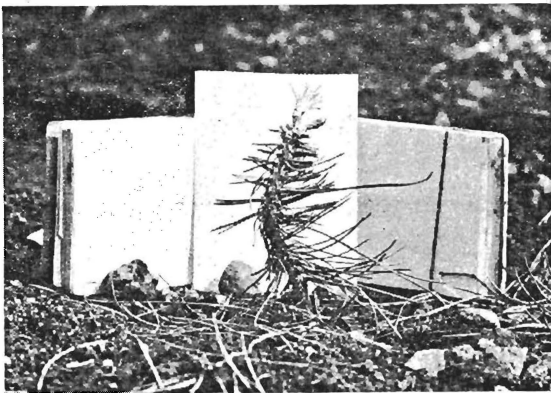
^{1/} Other tree species, apparently free of disease, occurred on the plots in the following numbers: mountain hemlock (20), Sitka spruce (7), white bark pine (2), grand fir (1), Port Orford cedar (6), and Pacific yew (1).

^{2/} Root diseases have not been included because of the extreme difficulty in recognizing these disorders under California conditions.

THE STATUS OF FOREST ANIMAL PESTS

BEAR damage in the north coast region remained at about the same level as in recent years. A survey of a 30,000-acre study area in Humboldt County disclosed that 6 per cent of the young redwood trees were damaged by bears during the past 17 years. In this portion of the State, control programs are needed on some areas in order to hold bear damage to a level compatible with sustained timber production.

DEER are considered to be a major deterrent to successful regeneration throughout Northern California. Where browsing is severe, trees are being retarded 8 to 15 years. A study in Humboldt County showed that trees that were protected from deer averaged 1.2 feet of growth per year, while unprotected trees grew only 0.6 feet. In another study area the average height of unprotected trees 4 years after planting was 0.65 feet, with only 36 per cent of the plantation surviving.



Deer browsing is a source of plantation failure in Northern California. Outrigger fences at the University of California's Hopland Station are proving effective in protecting crops from deer.

ELK herds have increased in recent years and are causing serious damage in the north coast region. Without control, damage may be expected to continue.

PORCUPINE damage declined in northeastern California but is increasing elsewhere. Although the animals are becoming more numerous in the north coast region, no positive porcupine damage has been reported from this location. Late summer drought conditions resulting in a shortage of normal feed were responsible for porcupine activity at widely separated locations where little damage has occurred in the past. Isolated instances of damage were reported west of Willows, and extensive damage occurred in young plantations east of Fresno. At both locations the affected trees were near flowing streams. Since porcupines are animals of low reproductive potential, it is unlikely that these outbreaks were a result of a sudden increase in population.

SQUIRREL damage was abundant this year, particularly in Mendocino and Humboldt Counties, but in many cases was erroneously attributed to porcupines. Damage consisted primarily of top girdling in young redwood saplings and was characterized by the absence of tooth marks on either the tree trunk or the narrow bark strips found at the base of injured trees. Much of the damage occurred during a relatively few days of extremely hot weather in June and July. A noticeable increase in squirrel populations that would account for the increased amount of injury has not been reported.

DEER MICE continued to be troublesome where artificial seeding is undertaken. Their depredation of natural seedfall is no doubt even more detrimental, but less noticeable. Repellent-treated seed is being used more widely, particularly in the Douglas-fir region.

MEADOW MICE are a problem only when seeds or seedlings are planted in sites supporting grass cover or adjacent to wet meadows or seeps.

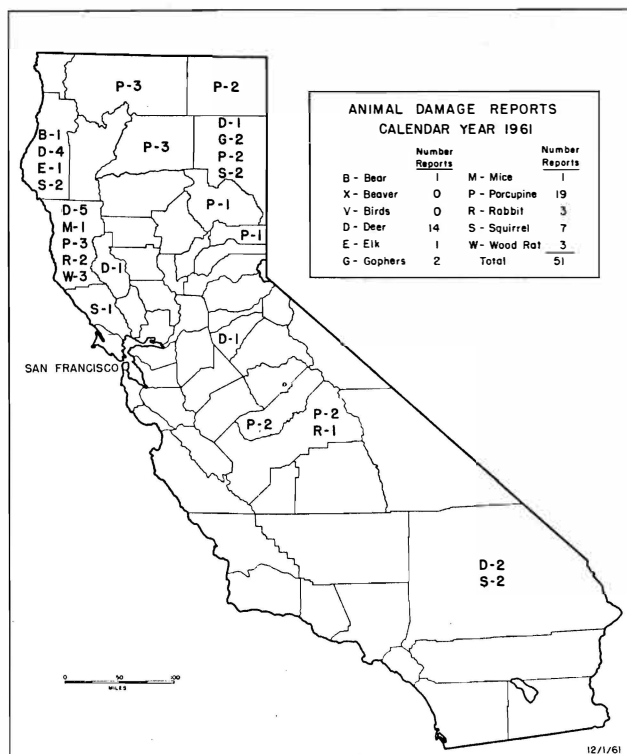
RABBIT damage in plantations was not extensive but is of considerable importance locally.

BEAVER, that have been planted in some forested areas, interfered with forest reproduction. Only a few cases were noted.

GOPHER damage was reported only twice during the year. Since these rodents destroy tree roots, the damage is often attributed to other causes.



Poisoning is one means of porcupine control. The firmly-anchored shelter keeps the poison block away from live stock and other large animals.

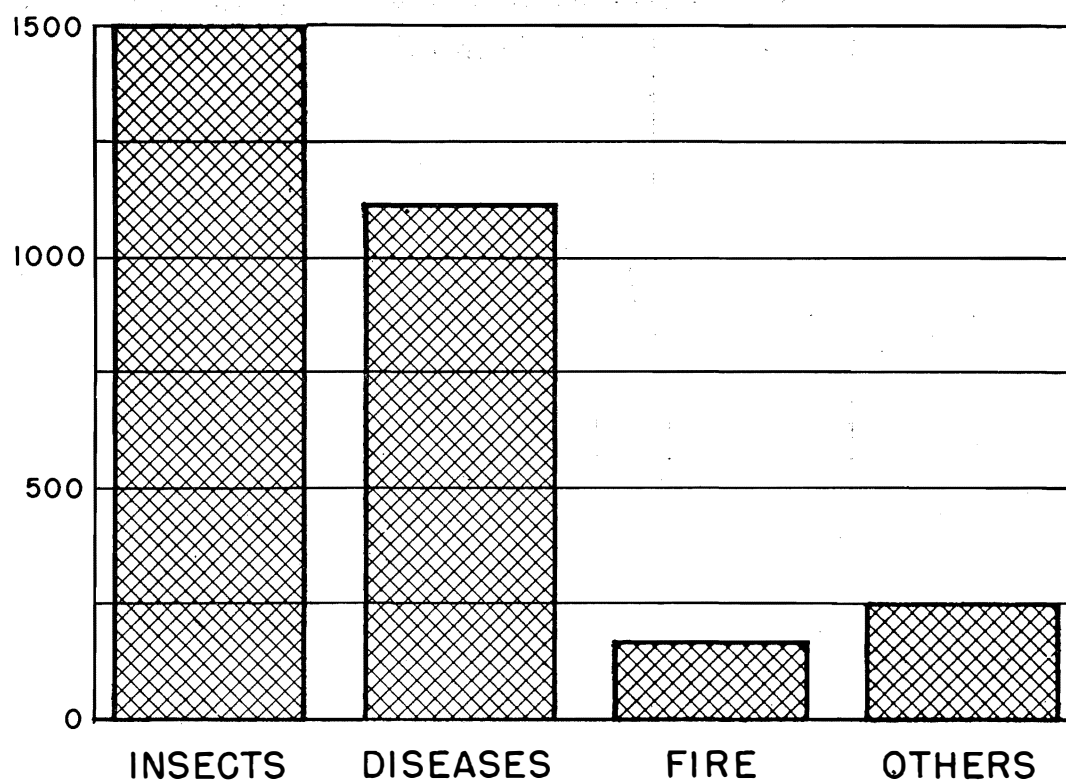


FOREST PEST CONTROL COUNCIL ENDORSEMENTS - 1961

The California Forest Pest Control Action Council at its annual meeting in November expressly endorsed the projects listed in table 3 and took the following actions:

1. Approved a study of an insect detection method involving the use of aerial photographs.
2. Resolved that pre-control and post-control evaluations be made a part of pest control operations in critical areas, where warranted, and that further emphasis be given to the development of control-evaluation procedures.
3. Approved a report of the disease committee calling attention to a serious lack of research in many fields, including root diseases. These diseases will assume increasing importance as intensive management becomes more widely applied.
4. Resolved that the California Fish and Game Commission be urged to retain its present deer management policy, to recognize deer damage to commercial timberland in that policy, and to recognize that the State deer herd is produced on private lands as well as on public lands.
5. Received the announcement that the State of California would establish an exterior quarantine against European pine shoot moth effective December 3. (This insect has not yet been collected in California.)
6. Approved publication of the bark-beetle control booklet, "The Terrible Two-some."

FOREST INSECTS AND DISEASES ARE THE MAIN CAUSES OF SAWTIMBER LOSS IN CALIFORNIA



ANNUAL LOSS ESTIMATES ARE IN MILLIONS OF BOARD FEET, AND INCLUDE BOTH TREES KILLED AND TREES IN WHICH GROWTH HAS BEEN REDUCED.

DATA ARE FROM: TIMBER RESOURCES FOR AMERICA'S FUTURE, U.S. DEPT. OF AGRICULTURE, FOREST SERVICE, 1958.